

REMARKS

The independent claims are method claims 1 and 18 and claims 13 and 21 directed to a spark plug. Review and reconsideration on the merits are requested.

Claims 18 and 26 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,215,235 to Osamura. Osamura was cited as disclosing the inventive method substantially as claimed, including (1) providing a chip comprising a flange portion and a protrusion; (2) tentatively joining; and (3) laser-welding the flange portion to the joint face, such that the resulting portion extends inward of corresponding intersections of the second face of the flange portion and imaginary extension lines of generatrices of a side surface of the protrusion.

Claims 1, 2, 4-6, 9, 12-17 and 21-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Osamura in view of U.S. Patent No. 4,581,558 to Takamura et al.

Takamura et al. was cited as disclosing a chip comprising a spark erosion resistant material meeting the compositional requirements of independent claims 1, 13 and 21 so as to mitigate thermal stress along the surface where the chip and the electrode are welded (column 5, lines 29-61).

Applicants traverse, and respectfully request the Examiner to reconsider in view of the amendments to the claims and the following remarks.

In reference to Figs. 3A to 3D, Osamura illustrates temporarily fixing the bottom surface of noble metallic firing tip 3 onto to the top surface 211 of rod portion 21 of the base electrode member 2. Osamura does not disclose a chip having a flange portion 1b as shown in Fig. 2 of the present specification or joining the second (lower) face of the flange portion opposite the protrusion to a joint face of the electrode base metal as required by claim 18. Furthermore, because Osamura fails to disclose a chip having a flange portion, Osamura also fails to disclose

the subject matter of claim 26, wherein that part of the flange portion extending outside the imaginary extension lines is entirely subsumed within the weld portion (as shown, for example, in Fig. 6 of the specification).

To clarify the above-noted distinctions over Osamura, claims 1 and 18 have been amended to recite providing a chip comprising a flange portion, where the flange extends outward of imaginary extension lines of generatrices of a side surface of the protrusion.

This characteristic feature of the invention is shown in Fig. 2, where flange 1b extends outward of imaginary extension lines of generatrices of a side surface of the protrusion 1a.

So as to further distinguish over the prior art, method claims 1 and 18 have been amended so as to include the step of applying a laser beam to the flange portion of the chip in an *oblique* direction to the joint face of the electrode base metal. In this manner, the weld portion extends not only outwardly and inwardly from imaginary extension lines of generatrices of a side face of the protrusion, but also extends below a lowest end of an outer surface of the laser-weld portion. As described in paragraphs [39] and [44], and as represented by the arrow of Fig. 5, a laser beam is irradiated (in an oblique direction) so as to weld the flange portion 1b of the chip 1 to the joint face 32 of the center electrode 30 or the joint face 42 of the ground electrode 40. Fig. 6 shows the resulting weld portion extending well below a lowest end of an outer surface of the laser-weld portion. Claims 13 and 21 directed to a spark plug have been similarly amended.

The amended claims patentably distinguish over Osamura because (i) the noble metal firing tip 3 of Osamura as shown in Figs. 3B and 3C does not have a flange portion as required by claims 1 and 18; (ii) smaller diameter rod portion 21 of Osamura is part of the base electrode member 2 and therefore is not a flange portion of the noble metal firing tip 3; (iii) because the noble metal firing tip 3 of Osamura has no flange portion, Osamura does not apply a laser to the

flange portion of the chip made of a spark erosion resistant material as required by claims 1 and 18; (iv) Osamura also does not apply a laser in an *oblique* direction to the joint face of the electrode base metal as required by present claims 1 and 18; and (v) consequently, the weld portion of claims 13 and 21 directed to a spark plug has a configuration that is different, in an unobvious way, from that of Osamura.

Regarding (iv) above, in Osamura, the laser beam is applied in a direction *normal* to the side surface of the noble metal firing tip 3 as shown in Fig. 8A (description at column 12, lines 17-21).

Regarding (v) above, in Osamura (see Fig. 10), the laser weld does not extend below a lowest end of an outer surface of the laser-weld portion as required by claims 1, 13, 18 and 21. See comparison of Fig. 6 of the invention with Fig. 10 of Osamura below.

Takamura et al. also does not disclose these characteristic features of the invention.

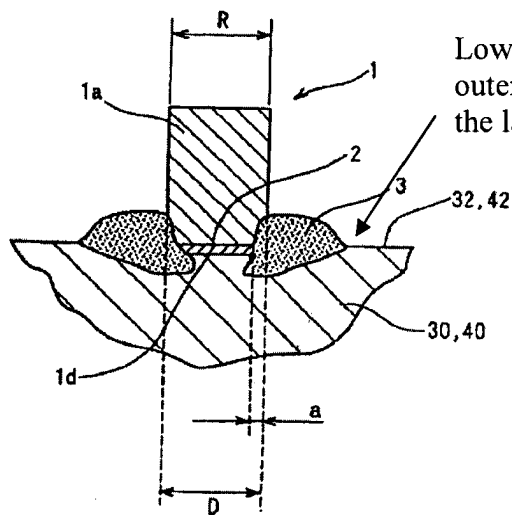


Fig. 6 of the invention

The laser-weld portion extends both outwardly and inwardly from imaginary extension lines of generatrices of the side surface of the protrusion, *and extends below a lowest end of an outer surface of the laser-weld portion*

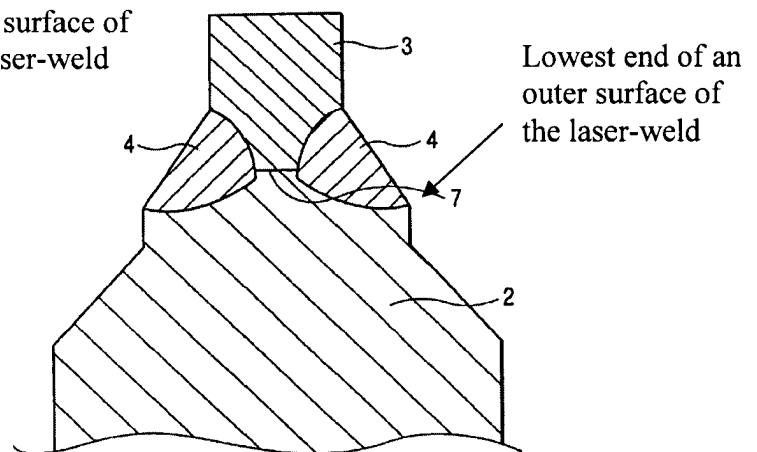


Fig. 10 of Osamura

The laser weld does not extend below a lowest end of an outer surface of the laser-weld portion

For the above reasons, it is respectfully submitted that the claims as amended are neither anticipated nor obvious over Osamura alone or in combination with Takamura et al., and withdrawal of the foregoing rejections is respectfully requested.

Further, amended claims 1, 13 and 21 define the spark erosion resistant material as being a Pt alloy, and amended claims 1 and 18 delete reference to resistance welding (now recited in dependent claims 28 and 29, respectively). Specifics relating to the alloy composition, or the specific method of the tentatively joining, are not needed to define over the prior art.

As claimed in new claim 27 depending from claim 1, the method comprises applying a laser beam to the flange portion of the chip in an oblique direction to the joint face of the electrode base metal of the ground electrode.

Withdrawal of all rejections and allowance of claims 1, 2, 4-6, 9, 12-18 and 21-29 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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